

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

MiiCs & PARTNERS AMERICA, INC., et al.,

Plaintiffs,

v.

TOSHIBA CORPORATION, et al.,

Defendants.

Civil Action No. 14-803-RGA

MiiCs & PARTNERS AMERICA, INC., et al.,

Plaintiffs,

v.

FUNAI ELECTRIC CO., LTD., et al.,

Defendants.

Civil Action No. 14-804-RGA

MEMORANDUM OPINION

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ANDREWS, U.S. DISTRICT JUDGE:

Presently before the Court is the issue of claim construction of multiple terms in U.S. Patent Nos. 5,966,589 (“the ’589 patent”), 6,211,534 (“the ’534 patent”), 6,417,833 (“the ’833 patent”), 6,734,927 (“the ’927 patent”), and 7,460,190 (“the ’190 patent”). The Court has considered the parties’ Joint Claim Construction Brief. (C.A. No. 14-803-RGA, D.I. 146; C.A. No. 14-804-RGA, D.I. 173).¹ The Court heard oral argument on August 10, 2016. (D.I. 160).

I. BACKGROUND

Plaintiffs filed these actions against Defendants Toshiba and Funai on June 24, 2014, alleging infringement of nine patents. (D.I. 1). With the Court’s permission, Plaintiffs filed First Amended Complaints on March 31, 2015, in which they asserted additional patents. (D.I. 35). On August 11, 2015, this Court stayed these cases pending *inter partes* review before the PTAB. (D.I. 82). After Plaintiffs agreed to withdraw certain patents on which the PTAB instituted IPR, the Court lifted the stays on March 23 and 31, 2016, respectively. (D.I. 112; C.A. No. 14-804-RGA, D.I. 117). On June 15, 2016, the Court granted Samsung Display Company’s (“SDC”) motion to intervene. (D.I. 139).² The remaining patents-in-suit generally relate to various liquid crystal display (“LCD”) apparatuses and thin film transistors (“TFTs”) used therein.

II. LEGAL STANDARD

“It is a bedrock principle of patent law that the claims of a patent define the invention to which the patentee is entitled the right to exclude.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (internal quotation marks omitted). “[T]here is no magic formula or catechism for conducting claim construction.’ Instead, the court is free to attach the appropriate

¹ Unless otherwise specifically noted, all references to the docket refer to Civil Action No. 14-803-RGA.

² For the sake of simplicity, general references to “Defendants” hereinafter should be deemed to encompass SDC, the Intervenor.

weight to appropriate sources ‘in light of the statutes and policies that inform patent law.’”

SoftView LLC v. Apple Inc., 2013 WL 4758195, at *1 (D. Del. Sept. 4, 2013) (quoting *Phillips*, 415 F.3d at 1324) (alteration in original). When construing patent claims, a court considers the literal language of the claim, the patent specification, and the prosecution history. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 977–80 (Fed. Cir. 1995) (en banc), *aff’d*, 517 U.S. 370 (1996). Of these sources, “the specification is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.” *Phillips*, 415 F.3d at 1315 (internal quotation marks omitted).

“[T]he words of a claim are generally given their ordinary and customary meaning. . . . [Which is] the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Id.* at 1312–13 (citations and internal quotation marks omitted). “[T]he ordinary meaning of a claim term is its meaning to [an] ordinary artisan after reading the entire patent.” *Id.* at 1321 (internal quotation marks omitted). “In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words.” *Id.* at 1314.

When a court relies solely upon the intrinsic evidence—the patent claims, the specification, and the prosecution history—the court’s construction is a determination of law. *See Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 841 (2015). The court may also make factual findings based upon consideration of extrinsic evidence, which “consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises.” *Phillips*, 415 F.3d at 1317–19 (internal quotation marks

omitted). Extrinsic evidence may assist the court in understanding the underlying technology, the meaning of terms to one skilled in the art, and how the invention works. *Id.* Extrinsic evidence, however, is less reliable and less useful in claim construction than the patent and its prosecution history. *Id.*

“A claim construction is persuasive, not because it follows a certain rule, but because it defines terms in the context of the whole patent.” *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998). It follows that “a claim interpretation that would exclude the inventor’s device is rarely the correct interpretation.” *Osram GMBH v. Int’l Trade Comm’n*, 505 F.3d 1351, 1358 (Fed. Cir. 2007) (citation and internal quotation marks omitted).

III. CONSTRUCTION OF DISPUTED TERMS

A. The '589 Patent

The '589 patent is directed to a method of fabricating a TFT array. Claim 1 is representative and reads as follows:

1. A method of fabricating a thin film transistor array comprising a transparent insulating substrate, a plurality of thin film transistors formed on said substrate in a matrix, a gate bus line connected to gate electrodes of said thin film transistors, a drain bus line connected to drain electrodes of said thin film transistors, and a pixel electrode driven by said thin film transistors, said method comprising the steps of:
 - (a) forming said gate electrodes and said gate bus line on said transparent insulating substrate;
 - (b) forming a gate insulating film over said substrate;
 - (c) forming an operative semiconductor on said gate insulating film;
 - (d) forming source electrodes, said drain electrodes, and said drain bus line of said thin film transistors on said gate insulating film and said operative semiconductor;
 - (e) forming a protection film over said substrate;

(f) removing a portion of both said gate insulating film and said protection film, located above a terminal of said gate bus line, and removing a portion of said protection film located above a terminal of said drain bus line; and

(g) forming said pixel electrode on said substrate.

(’589 patent, claim 1).

1. “a terminal of said [gate/drain] bus line” (’589 patent, claims 1, 7, 8)

- a. *Plaintiffs’ proposed construction*: “a point of connection along the [gate/drain] bus line outside the TFT array area”
- b. *Defendants’ proposed construction*: “plain and ordinary meaning, i.e., an end portion of the [gate/drain] bus line”
- c. *Court’s construction*: “a point for connection of the [gate/drain] bus line”

At oral argument, the parties agreed to construe a “terminal of said [gate/drain] bus line”

to mean “a point for connection of the [gate/drain] bus line.” (D.I. 160 at 103–04).

2. “operative semiconductor” (’589 patent, claims 1 and 4)

- a. *Plaintiffs’ proposed construction*: “a portion or portions of the semiconductor layers, comprising a-Si and n+-doped a-Si, formed (i.e., patterned within a TFT array)”
- b. *Defendants’ proposed construction*: “a portion of the semiconductor layer(s) within a TFT that overlies the gate electrode and contacts and connects the drain and source electrodes”
- c. *Court’s construction*: “a portion of the semiconductor layer(s) within a TFT that overlies the gate electrode and contacts and connects the drain and source electrodes”

Plaintiffs argue that the specification demonstrates that “‘forming an operative semiconductor’ in step (c) of claim 1 ‘refers to the patterning of the amorphous film 21 which includes a-Si and n+-doped a-Si.’” (D.I. 146 at 17). Plaintiffs’ proposed construction also only requires that the operative semiconductor be within a TFT array, rather than part of individual TFTs. Defendants argue that the claim language and specification support its proposed construction, which requires the operative semiconductor to be within a TFT, overlie the gate

electrode, and connect the drain and source electrodes. (*Id.* at 19). Defendants also contend that by requiring the operative semiconductor to be formed through patterning, Plaintiffs seek to improperly limit the claimed methods to an exemplary embodiment. (*Id.* at 20).

The Court will adopt Defendants' proposed construction. This construction is consistent with the language of the claims themselves, which describe the operative semiconductor as being formed on the gate insulating film, which is itself formed over the gate electrode on the transparent insulating substrate. ('589 patent, claim 1). Claim 1 also describes the source electrodes and drain electrodes being formed on both the gate insulating film and the operative semiconductor. (*Id.*). Defendants' construction accurately describes this configuration and properly captures the semiconductor's function of serving as a transistor, turning the connection between the source electrode and drain electrode on and off based on the input from the gate electrode. Plaintiffs' proposed construction, on the other hand, gives no meaning to the term "operative" and seeks to include silicon formations that act simply as insulators, even though they are not acting as semiconductors in those instances.

Furthermore, the claims use the word "formed" and nothing in the specification demonstrates intent on the part of the patentee to limit the term to "patterning." (*See, e.g.*, '589 patent, col. 5, ll. 50–55 (describing formation "by plasma-enhanced chemical vapor deposition (CVD)"). The specification describes each of the individual "TFTs [being] comprised of," among other components, "an operative semiconductor film 6," rather than the TFT arrays more generally. (*Id.* col. 5, ll. 5–7). I also think Plaintiffs' inclusion of a-Si and n+-doped a-Si improperly limits the claim terms based on one embodiment disclosed in the specification.

Accordingly, the Court will construe “operative semiconductor” to mean “a portion of the semiconductor layer(s) within a TFT that overlies the gate electrode and contacts and connects the drain and source electrodes.”

3. Whether the Claimed Method Can Encompass a “Lift-Off” Operation

- a. *Plaintiffs’ proposed construction*: The claimed method cannot encompass a lift-off operation.
- b. *Defendants’ proposed construction*: The claimed method can encompass a lift-off operation.
- c. *Court’s construction*: The claimed method cannot encompass a lift-off operation.

The parties dispute whether the ’589 patent expressly disclaims the use of “lift-off operations” as part of the claimed method. (D.I. 146 at 23–25). Plaintiffs point to a portion of the specification stating that the patented method does not employ lift-off. (*Id.* at 23).

Defendants argue that because the claims use the open-ended transition “comprising,” it dictates that the ’589 patent claims may have additional steps. (*Id.* at 23–24). Defendants also point to a PTAB decision suggesting that the objectives of the invention do not require that the claims be construed as limited only to structures capable of achieving all the objectives. (*Id.* at 24).

“[T]he specification and prosecution history only compel departure from the plain meaning in two instances: lexicography and disavowal.” *GE Lighting Solutions, LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014). The standard for finding disavowal has been described as “exacting” and “requires that the specification [or prosecution history] make[] clear that the invention does not include a particular feature.” *Id.* (alterations in original) (internal quotation marks omitted). However, “[w]here the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent, even though the language of the claims, read without reference to the

specification, might be considered broad enough to encompass the feature in question.” *Chicago Bd. Options Exch., Inc. v. Int’l Sec. Exch., LLC*, 677 F.3d 1361, 1372 (Fed Cir. 2012) (alteration in original) (internal quotation marks omitted). Disavowal need not be explicitly stated as long as a POSA would understand—after reading the claims, specification, and prosecution history—that the invention does not encompass a particular feature. *See SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1344 (Fed. Cir. 2001) (“[T]he written description can provide guidance as to the meaning of the claims, thereby dictating the manner in which the claims are to be construed, even if the guidance is not provided in explicit definitional format.”). For instance, “repeated derogatory statements concerning one type of [feature can be] the equivalent of disavowal of that subject matter from the scope of the patent’s claims.” *Honeywell Int’l, Inc. v. ITT Indus., Inc.*, 452 F.3d 1312, 1320 (Fed. Cir. 2006).

I conclude that the patentee clearly and unambiguously disavowed the use of a lift-off operation. In the summary of the invention section of the ’589 patent, the specification explicitly states, “Since the method in accordance with the present invention does not employ lift-off unlike the conventional methods, debris caused by lift-off is not generated.” (’589 patent, col. 4, ll. 5–7). Plainly, this is not a statement of the objectives of the invention as Defendants suggest. It is an unequivocal statement clarifying that the method of the present invention does not employ lift-off. Moreover, the specification disparages the prior art for using lift-off because it generates debris and lowers yield. (*Id.* col. 2, ll. 37–44 (“[S]ince the methods having been suggested in [the prior art] employ[] the lift-off process . . . there generates debris when the film and the photoresist film are removed, resulting in that a fabrication yield is lowered.”)). Defendants ignore these portions of the specification and simply suggest that the claim language itself is not so limited. Yet the ’589 patent specification clearly articulates that the invention

does not include a lift-off operation. Accordingly, a lift-off operation must be considered outside the reach of the claims even if the claim language itself could be read not to exclude a lift-off operation. *See Chicago Bd.*, 677 F.3d at 1372.

4. Exclusion of Other Steps

- a. *Plaintiffs' proposed construction:* The '589 patent explicitly disclaims the use of any more than five patterning steps in the claimed invention to fabricate the TFT array.
- b. *Defendants' proposed construction:* The specification does not disavow use of more than five photolithography steps and the claims are not so limited.
- c. *Court's construction:* The specification does not disavow use of more than five photolithography steps and the claims are not so limited.

The parties also dispute whether the specification disavows the use of more than five photolithography (patterning) steps in the claimed method of fabricating a TFT array. (D.I. 146 at 25–28). Plaintiffs assert that the following statements from the specification disavow using more than five photolithography steps:

[T]he above-mentioned method needs to carry out only five photolithography steps to fabricate a thin film transistor array, whereas the conventional methods have to carry out six photolithography steps. ('589 patent, abstract).

In view of the foregoing problems of the conventional methods, it is an object of the present invention to provide a method of fabricating a thin film transistor array on a substrate with a higher fabrication efficiency, in particular, with reduction in the number of photolithography steps. ('589 patent, col. 2, ll. 56–61).

[T]he conventional methods need to carry out six photolithography steps for fabricating a TFT array on a substrate. In contrast, the method as defined in claim 1 need to carry out only five photolithography steps ('589 patent, 3:66–4:2).

(D.I. 146 at 26). Defendants, however, point to several other portions in the specification that use permissive language seeming to describe the use of only five photolithography steps as an optional feature:

[In] accordance with the above-mentioned first embodiment, TFT may be completed by carrying out only five photolithography steps ('589 patent, col. 7, ll. 9–12).

[T]he method in accordance with the present invention has no factors for reducing a fabrication yield, and further can shorten fabrication steps. ('589 patent, col. 4, ll. 12–14).

(D.I. 146 at 27). Defendants also argue that because the claims use the open-ended modifier “comprising,” they leave open the possibility of additional steps. (*Id.* at 26).

I conclude that the specification does not clearly and unmistakably disavow using more than five photolithography steps. The specification certainly describes an important feature of the invention being its ability to fabricate TFTs with only five photolithography steps, but does not go so far as to exclude using more steps from the scope of the claims. It states that the invention only needs to use five photolithography steps, but does not state, for example, that the invention must only use five photolithography steps or definitely cannot use more than five steps. Indeed, the permissive statements in the other portions of the specification—stating that that the TFT *may* or *can* be fabricated with only five photolithography steps—seem to hedge as to whether five or less steps is a requirement. Lastly, it is significant that these method claims describe the steps with the open-ended modifier “comprising,” which allow more steps to be added and still be within the scope of the patent’s claims. Overall, the specification does not meet the exacting standard of making clear that the invention does not include methods employing more than five photolithography steps. See *GE Lighting*, 750 F.3d at 1309.

B. The '534 Patent

The '534 patent is directed to “[a] TFT array for a liquid crystal display device in which inferiority due to electrification or abnormal discharge during fabrication process can be decreased.” ('534 patent, abstract). Claim 1, the only claim at issue, reads as follows:

1. A thin film transistor array comprising:

a substrate;

a plurality of pixel electrodes formed on said substrate and disposed in a matrix having rows and columns;

a plurality of thin film transistors (TFTs) for display which are formed on said substrate and each of which is connected to a corresponding one of said pixel electrodes;

a plurality of gate wirings which are formed on said substrate, which are formed by a first conductor layer, each of which is disposed along every row of said pixel electrodes and each of which is used for supplying a gate signal to said TFTs in a corresponding row;

a plurality of signal lines which are formed on said substrate, which are formed by a second conductor layer, each of which is disposed along every column of said pixel electrodes, and each of which is used for supplying a data signal to said TFTs in a corresponding column;

a common conductor line on the gate wiring side formed on said substrate and extending in a direction perpendicular to the direction of extension of said gate wirings;

a common conductor line on the signal line side formed on said substrate and extending in a direction perpendicular to the direction of extension of said signal lines;

nonlinear elements which are respectively disposed between one end of each of said gate wirings and said common conductor line on the gate wiring side and between one end of each of said signal lines and said common conductor line on the signal line side, and each of which comprises a plurality of TFTs;

wherein one of gate electrodes of said TFTs in each of said nonlinear elements disposed between one ends of said gate wirings and said common conductor line on the gate wiring side is formed separately from said common conductor line on the gate wiring side;

wherein one of source/drain electrodes of said TFTs in each of said nonlinear elements disposed between one ends of said signal lines and said common conductor line on the signal line side is formed separately from said common conductor line on the signal line side;

wherein said one of the gate electrodes of said TFTs in each of said nonlinear elements disposed between one ends of said gate wirings and said common

conductor line on the gate wiring side is electrically coupled to said common conductor line on the gate wiring side via contact holes formed in an insulating film formed on said first and second conductor layers and via a third conductor layer; and

wherein said one of the source/drain electrode of said TFTs in each of said nonlinear elements disposed between one ends of said signal lines and said common conductor line on the signal line side is electrically coupled to said common conductor line on the signal line side via contact holes formed in said insulating film formed on said first and second conductor layers and via said third conductor layer.

(’534 patent, claim 1).

1. “formed separately” (claim 1)

- a. *Plaintiffs’ proposed construction*: “not formed together in the same layer”
- b. *Defendants’ proposed construction*: “formed physically detached from each other so that an electrical connection requires an additional conductive element.”
- c. *Court’s construction*: “formed physically detached from each other so that an electrical connection requires an additional conductive element.”

Plaintiffs argue that “formed separately” means one of the gate electrodes is not formed in the same conductor layer as the common conductor line. (D.I. 146 at 28–29). To support their argument, Plaintiffs point to a brief passage in the specification, describing an embodiment of the invention, which they contend makes evident that “the common line 4 is not formed together in the same layer as gate electrodes 5 and 6.” (*Id.* at 29 (citing ’534 patent, col. 6, ll. 40–64)).

Defendants focus on the language of claim 1, asserting that it “recites two sets of conductive elements that are ‘formed separately from’ each other and then ‘electrically coupled to’ each other ‘via contact holes . . . and via a third conductor layer.’” (*Id.* (quoting ’534 patent, claim 1 (alteration in original) (citations omitted))). Defendants contend that the specification describes an important feature of the invention being the lack of an electrical connection during the manufacturing process so that no rush current occurs between the conductive elements during manufacturing. (*Id.* at 29–30). Thus, Defendants argue that “it follows from [the] claim

language that the elements formed ‘separately from’ each other must be formed physically detached from each other so that an electrical connection (i.e., being ‘electrically coupled’) requires an additional conductive element (i.e., ‘contact holes’ and a ‘third conductor layer’” (*Id.* at 29).

The Court will adopt Defendants’ proposed construction. The term “formed separately” appears twice in claim 1, which states that “one of [gate or source/drain] electrodes of said TFTs in each of said nonlinear elements . . . is formed separately from said common conductor line on the [gate wiring/signal line] side” (’534 patent, 15:66–16:8). The portions of the specification Plaintiffs cite say nothing requiring that the electrodes be formed in different layers than the common conductor lines. (’534 patent, 6:37–7:7). Had the patentee truly intended that such elements must be parts of different layers, one would expect that requirement to be stated clearly. In any event, Plaintiffs have not persuasively established that this limitation is otherwise required in order for the invention to function as described in the patent. While the language of claim 1 specifies that the elements of the gate wiring side “are formed by a first conductor layer” and the elements of the signal line side “are formed by a second conductor layer,” it does not describe the nonlinear elements, of which the gate and source/drain electrodes are a part, as being part of a layer or not part of a layer. (’534 patent, col. 15, ll. 41–52). Instead, the claims merely state that the “nonlinear elements [] are respectively disposed between one end of each of said gate wirings and said common conductor line on the gate wiring side and between one end of each of said signal lines and said common conductor line on the signal line side” (*Id.* col. 15, ll. 60–64).

Defendants’ construction, on the other hand, captures the key characteristic of the formed separately limitation. One of the objects of the invention is “to provide a thin film transistor

array in which occurrence of a rush current during a manufacturing process thereof can be suppressed.” (’534 patent, col. 3, ll. 55–58). The specification explains that “the TFT 10 among two TFTs forming the nonlinear element [11/30] is formed as an island like region and is *not yet electrically connected* to the common line on the [gate wiring side 4/signal line side 21].” (*Id.*, col. 9, ll. 9–13, 25–28 (emphasis added)). It further elucidates that because of this lack of electrical connection, “no rush current occurs between the [gate wiring 13/signal line 14] and the common line on the [gate wiring side 4/signal line side 21].” (*Id.* col. 9, ll. 19–20, 34–36). This construction is consistent with the language of claim one, which describes the gate and source/drain electrodes being formed separately from the common conductor lines but electrically coupled to them. (*Id.* col. 15, 15:66–16:23).

Accordingly, the Court will construe “formed separately” to mean “formed physically detached from each other so that an electrical connection requires an additional conductive element.”

C. The ’833 Patent

The ’833 patent is directed to “a liquid crystal display apparatus that can reduce noises so as to improve a quality of display and a method for lighting a backlight thereof.” (’833 patent col. 1, ll. 8–11). Claim 1 is representative and reads as follows:

1. A liquid crystal display apparatus, comprising:
 - a first backlight; and
 - a second backlight which is driven simultaneously with said first backlight, said second backlight having an oscillation wave whose phase is inverted with respect to an oscillation wave of the first backlight.

(’833 patent, claim 1).

1. Preamble (of claims 1, 9, and 16)

- a. *Plaintiffs' proposed construction*: The preamble carries patentable weight and is limiting to the claimed “liquid crystal display apparatus”
- b. *Defendants' proposed construction*: “No patentable weight accorded to preamble.
- c. *Court's construction*: The preamble carries patentable weight and is limiting to the claimed “liquid crystal display apparatus”

The parties' sole dispute is whether the preambles of claims 1, 9, and 16—which describe the invention as a “liquid crystal display apparatus”—are limiting. (D.I. 146 at 33–38). Plaintiffs argue that these preambles are structural limitations that are necessary components of describing the precise invention contemplated by the '833 patent. (*Id.* at 34). Plaintiffs assert that the repeated descriptions of the invention in the specification as being a “liquid crystal display apparatus” are evidence that the invention is limited to such devices. (*Id.* at 34–35). Defendants argue that the claims describe a structurally complete, standalone invention independent of the preamble. (*Id.* at 35). Accordingly, Defendants contend that the preamble is merely a statement of intended use for the invention. (*Id.* at 36).

“Whether to treat a preamble term as a claim limitation is determined on the facts of each case in light of the claim as a whole and the invention described in the patent.” *Am. Med. Sys., Inc. v. Biolitec, Inc.*, 618 F.3d 1354, 1358 (Fed. Cir. 2010) (internal quotation marks omitted). “Generally, the preamble does not limit the claims.” *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002). “[A] preamble limits the invention if it recites essential structure or steps, or if it is necessary to give life, meaning, and vitality to the claim.” *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (internal quotation marks omitted). “Conversely, a preamble is not limiting where a patentee

defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention.” *Id.* (internal quotation marks omitted).

“No litmus test defines when a preamble limits claim scope. Some guideposts, however, have emerged from various cases discussing the preamble’s effect on claim scope.” *Id.* (citation omitted). “The effect preamble language should be given can be resolved only on review of the entirety of the patent to gain an understanding of what the inventors actually invented and intended to encompass by the claim.” *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257 (Fed. Cir. 1989). For instance, “when reciting additional structure or steps underscored as important by the specification, the preamble may operate as a claim limitation.” *Catalina Mktg.*, 289 F.3d at 808. “Moreover, clear reliance on the preamble during prosecution to distinguish the claimed invention from the prior art transforms the preamble into a claim limitation because such reliance indicates use of the preamble to define, in part, the claimed invention.” *Id.* “Without such reliance, however, a preamble generally is not limiting when the claim body describes a structurally complete invention such that deletion of the preamble phrase does not affect the structure or steps of the claimed invention.” *Id.* at 809. “Thus, preamble language merely extolling benefits or features of the claimed invention does not limit the claim scope without clear reliance on those benefits or features as patentably significant.” *Id.*

After reviewing the entirety of the ’833 patent, I conclude that the preambles describing the invention as a “liquid crystal display apparatus” are limiting. The ’833 patent is entitled “Liquid Crystal Display Apparatus and Method for Lighting Backlight Thereof.” The abstract immediately states, “In the liquid crystal display, a first backlight and a second backlight are provided and lightened simultaneously.” (’833 patent, abstract). The first two sentences of the specification state:

The present invention relates to a *liquid crystal display apparatus* and a method for lighting a backlight thereof. More specifically, the present invention relates to a *liquid crystal display apparatus* that can reduce noises so as to improve a quality of display and a method for lighting a backlight thereof.

(*Id.* col. 1, ll. 7–11 (emphases added)). In the summary of the invention section, the specification goes on to state, “An object of the present invention is to provide a liquid crystal display apparatus with improved quality of display and a method for lighting the backlight thereof”

(*Id.* col. 2, ll. 8–10). In total, the rather brief specification describes the “present invention” and its various embodiments as “a liquid crystal display apparatus” fifteen times. (*Id.* col. 1, l. 13; *id.* col. 2, ll. 15, 20–21, 32–33, 49, 52, 56; *id.* col. 3, ll. 2, 15, 19, 30–31; *id.* col. 4, l. 9).

After reviewing the '833 patent as a whole, it is inconceivable that a reader would come away with anything but a firm conviction that the inventor invented and intended the claims to encompass a liquid crystal display apparatus, rather than some vague combination of two backlights. *See Corning Glass*, 868 F.3d at 1257. The specification makes clear that the inventor sought to solve particular problems occurring in the field of LCD technology: improving the quality of display and eliminating ripple noise. (*See, e.g.*, '833 patent, col. 2, ll. 8–14). Moreover, the “liquid crystal display apparatus” preamble does not merely state an intended use. Rather, it provides an important structural limitation, which is repeatedly underscored as important by the specification. *See Catalina Mktg.*, 289 F.3d at 808. If the preamble were not construed as limiting, claim 1 would be so broad as to read on any combination of two backlights no matter what kind of apparatus they were contained in. “To read the claim[s] in light of the specification indiscriminately to cover [any combination of two backlights] would be divorced from reality.” *See Corning Glass*, 868 F.2d at 1257. Accordingly, I conclude that the preambles of claims 1, 9, and 16 are limiting.

2. “First Backlight” and “Second Backlight”

- a. *Plaintiffs’ proposed construction*: “[first backlight] a lamp or set of lamps for illumination from behind the liquid crystal display apparatus [second backlight] all remaining lamps of the liquid crystal display apparatus that are not in the first backlight”
- b. *Defendants’ proposed construction*: “[first backlight] first lamp or set of lamps each of which is driven using an oscillation wave that is synchronized in terms of frequency and phase with the oscillation waves used to drive the other of the multiple lamps” “[second backlight] a second lamp or set of lamps each of which is driven differently than the first backlight using an oscillation wave that is synchronized in terms of frequency and phase with the oscillation waves used to drive the other of the multiple lamps of the second backlight”
- c. *Court’s construction*: First Backlight: “a lamp or set of lamps for illumination from behind the liquid crystal display apparatus, each of which is driven using an oscillation wave that is synchronized in terms of frequency and phase with the oscillation waves used to drive all other lamps of the first backlight.” Second Backlight: “a second lamp or set of lamps for illumination from behind the liquid crystal display apparatus, each of which is driven using an oscillation wave that is synchronized in terms of frequency and phase with the oscillation waves used to drive all other lamps of the second backlight.”

Plaintiffs argue that that “the plain and ordinary meaning given to the term ‘backlight’ by those of ordinary skill in the art is a form of illumination from behind, which, as taught by the preamble and is clear from the specification, is used in LCDs.” (D.I. 146 at 38). Plaintiffs emphasize the problem solved by the ’833 patent: “eliminat[ing] a problematic ripple effect in LCDs caused by interference between an oscillation wave of the backlight and a horizontal synchronization signal of the video signal.” (*Id.* at 39). Thus, Plaintiffs assert, this interference is eliminated by the present invention because wave noise can be canceled by the use of a first and second backlight, “whose phases of the oscillation waveforms are opposite to each other.” (*Id.* (quoting ’833 patent, col. 2, ll. 27–30)). Plaintiffs further contend, “This cancellation is possible only if all of the lamps belong to either the first or the second backlight.” (*Id.*). Moreover, Plaintiffs point out that the two disclosed embodiments define “all of the lamps that are used in the backlight [] as belonging to either a first backlight or a second backlight.” (*Id.*).

Defendants likewise assert that the terms must be viewed in the context of the invention's disclosure that "noise can be reduced, and interference can essentially be eliminated, by driving one set of lamps, which the patents calls the 'second backlight,' in a way that effectively cancels out the noise associated with a first set, which the patent calls the 'first backlight.'" (*Id.* at 40). Defendants argue that the embodiments of the patent make clear that "a key factor in determining whether a set of multiple lamps qualifies collectively as a 'backlight' is whether each lamp in the set is driven by an oscillation wave that is synchronized in terms of frequency (i.e., period) and phase" (*Id.* at 40–41). Defendants further assert that the specification also makes clear that "the lamps of the first and second backlight differ from each other in that the second backlight has the 'opposite phase to the first backlight.'" (*Id.* at 41). Defendants contend that this limitation is necessary because Plaintiffs are attempting to read the patent on products with lamps that are driven identically, in other words, on lamps that do not have two sets of backlights driven by oscillation waves in the opposite phase. (*Id.* at 42). Defendants also argue that Plaintiffs' proposal to limit the second backlight to all remaining lamps of the liquid crystal display apparatus that are not in the first backlight' is inconsistent with the claim language that uses the open-ended transitional phrase "comprising," which does not exclude additional, unrecited elements. (*Id.*).

I agree with Defendants' that the open-ended modifier comprising shows that the patentee did not claim that the second backlight must be comprised of all remaining lamps not a part of the first backlight. While the specification describes a grouping of two backlights as solving a problem in the prior art, nothing expressly precludes the possibility of additional backlights or configurations. In any event, the open-ended claim language suggests that

additional features could be added to the invention and contradicts Plaintiffs' effort to limit the term.

I do not think it is necessary to include, as Defendants propose, that the lamps in the second backlight are driven differently than the lamps in the first backlight. The fact that the oscillation wave of the second backlight is opposite to that of the first backlight is captured by the express language of the claims, referring to inversion of its wave with respect to the oscillation wave driving the first backlight. (*See, e.g.*, '833 patent, claim 1 ("said second backlight having an oscillation wave whose phase is inverted with respect to an oscillation wave of the first backlight.")). Defendants are concerned that Plaintiffs are improperly attempting to read this claim term on lamps that are "driven identically," but I think whether this is so will be a fact question to be decided further down the line. The language requiring inversion with respect to the waves driving the first backlight certainly suggests that the lamps of the first and second backlights are not driven identically, but I do not think that the terms "first backlight" and "second backlight" by themselves require that the two backlights be driven differently.

I do agree with Defendants, however, that in order to qualify as a backlight, a set of multiple lamps must all be driven by oscillation waves that are synchronized in terms of frequency and phase. (*See, e.g.*, '833 patent, col. 1, ll. 40–43 ("If the oscillation waves for driving the lamps are not synchronized with each other, plural lamp oscillations will be interfered to each other, and a large interference noise will be generated periodically."); *id.* at 3:65–4:2 (disclosing an embodiment where the lamps constituting the first backlight have "the same period and oscillat[e] in synchronization")). If the lamps making up each backlight were not in synchronization, the invention would not solve the problem to which the patent is directed, because a large interference noise would be generated. Plaintiffs contend that including this in

the claim construction would be redundant because “the oscillation phase is [] inherently the same for all lamps of a respective first or second backlight because the claims themselves separately defined that oscillation phases differ for the first and second backlight.” (D.I. 146 at 43). At best, I think this point is implied by the claim language, but not clearly outlined.

Because the claimed invention could not eliminate the ripple noise if the lamps in each backlight were not synchronized, I think it is the better course to make that clear, rather than leave it ambiguous. Accordingly, I will include it as a limitation in the claim construction.

Lastly, for the same reasons discussed above, I conclude that the invention is limited to a liquid crystal display apparatus. Defendants do not truly contend that the backlights do not illuminate from behind. Accordingly, that limitation will constitute part of the construction as well.

3. “second backlight having an oscillation wave” and “an oscillation wave of the first backlight”
 - a. *Plaintiffs’ proposed construction*: “[second backlight having an oscillation wave] an oscillation wave, repeatedly and regularly fluctuating above and below a mean value that drives the second backlight source.” “[an oscillation wave of the first backlight] an oscillation wave, repeatedly and regularly fluctuating above and below a mean value that drives the first backlight source.”
 - b. *Defendants’ proposed construction*: Indefinite. In the alternative, these terms require that each lamp comprising a claimed ‘backlight’ must be driven by one and only one oscillation wave. That, is the phrases should be interpreted as “second backlight being driven by one synchronized oscillation wave” and “the one synchronized oscillation wave that drives the first backlight”
 - c. *Court’s construction*: Not indefinite. No construction necessary. The “one and only one” limitation is rejected.

The parties essentially dispute whether each lamp can receive only one oscillation wave. (D.I. 146 at 44–50). Neither party offers a construction that is particularly helpful. Plaintiffs provide a definition of oscillation wave that is essentially their interpretation of Figures 9A and 9B of the patent—“repeatedly and regularly fluctuating above and below a mean value”—rather

than any actual description in the specification or definition from extrinsic evidence. (D.I. 146 at 45). Citing nothing, Plaintiffs thus argue that “an artisan reading the ’833 patent would clearly understand that to accomplish the claimed goal of suppression of the ripple phenomenon, the oscillation wave must meet these characteristics.” (*Id.*). Defendants argue, citing nothing, that “[b]ecause the claim language specifying ‘an oscillation wave of’ the first backlight or a second backlight ‘having an oscillation wave’ is ambiguous, one of ordinary skill trying to understand the bounds of the claim would need to resort to the specification.” (*Id.*).³ Defendants then contend that “[t]he specification’s description of the alleged invention requires that each lamp comprising a backlight be driven by one and only one oscillation wave (i.e., one oscillating voltage input).” (*Id.*). Defendants’ support for this argument is a portion of the summary of the invention section in the specification that refers to *the* oscillation waveform (singular)—“the oscillation waveform with respect to the oscillation waveform of the first backlight”—and descriptions of the embodiments shown in Figures 6, 7, 11, and 12. (*Id.* (citing ’833 patent, col. 2, ll. 20–25; *id.* at 3:31–4:7, *id.* col. 4, ll. 44–52, Figs. 6, 7, 11, 12)).

Nothing in the specification explicitly limits the term “oscillation wave” to one wave per lamp. As with the previous term, however, the specification does require that each lamp in a particular backlight have the same oscillation *waveform*, i.e., the lamps making up each backlight must be driven by oscillation waves that are synchronized in terms of frequency and phase. (*See, e.g.,* ’833 patent, col. 1, ll. 40–43; *id.* col. 2, ll. 26–29; *id.* at 3:65–4:2). That point is adequately captured by the Court’s construction of “First Backlight” and “Second Backlight,” which requires that the lamps constituting each backlight be synchronized in terms of frequency and

³ I do not think the term “oscillation wave” is even arguably ambiguous. In any event, I certainly would not hold it indefinite at this stage based merely on attorney argument, in the absence of any evidence about what a POSA would understand.

phase. I do not think the synchronization requirement is necessarily synonymous with “one and only one oscillation wave.” Indeed, it seems that this limitation could be met even if there were multiple waves, as long as they were all synchronized in terms of frequency and phase.

Otherwise, it does not seem that the parties actually dispute what an oscillation wave is generally. Accordingly, I do not think it is necessary to construe that term in isolation, especially because neither party cites any evidence of what the ordinary and customary meaning of that term would be to a POSA.⁴ Instead, both parties simply rely on attorney argument interpreting the various figures of the ’833 patent.

Accordingly, the Court will reject Defendants’ indefiniteness argument and “one and only one” limitation, but will decline to construe the term “oscillation wave” in isolation.

D. The ’927 Patent

The ’927 patent claims LCD panels that employ an upper, lower, and intermediate frame to hold the components together via stepped protrusions. (’927 patent, abstract, claim 1). Claim 1 is representative and reads as follows:

1. A liquid crystal display, comprising:

a liquid crystal display panel held between an upper frame and a lower frame by using an intermediate frame, said upper frame including a display window,

wherein one of said upper frame and said lower frame comprises a stepped protrusion formed in the vicinity of its end;

wherein said intermediate frame comprises a depression formed in the vicinity of its end, the depression to be fitted to said stepped protrusion; and

wherein said intermediate frame is fixed to one of said upper frame and said lower frame so that said liquid crystal display panel is fixed to one of said upper frame and said lower frame.

(’927 patent, claim 1).

⁴ I expect “oscillation wave” has a well-understood meaning in the art. I see no evidence that the term is used in the patent inconsistently with that meaning. I will be surprised if the experts do not agree on what it is.

1. “an upper frame and a lower frame”

- a. *Plaintiffs’ proposed construction*: “a substantially rigid supporting or surrounding structure above the lower and intermediate frames, and a substantially rigid supporting or surrounding structure below the upper and intermediate frames”
- b. *Defendants’ proposed construction*: “an upper frame and a lower frame coupled together via a portion that is U-shaped or similarly shaped, such that the coupling allows the upper and lower frames to be folded 180° with respect to one another”
- c. *Court’s construction*: Plain and ordinary meaning. The “U-shaped coupling” and “180 degree folding” limitations are rejected.

The parties do not dispute what an upper and lower frame are generally. Rather, they dispute whether the specification limits the claims to a configuration where the upper and lower frame are coupled together via a portion that is U-shaped and allows the frames to be folded 180 degrees with respect to one another. Plaintiffs argue that the terms upper frame and lower frame appear throughout the specification of the ’927 patent but are not expressly defined or limited, and therefore should be given their plain and ordinary meaning. (D.I. 146 at 51). Defendants argue that the ’927 patent purported to address problems with prior art LCD devices, including high material and labor costs, “by using a single piece of material that can be folded in half to create an upper frame and a lower frame connected on one side, like a clamshell.” (*Id.* at 52). Defendants contend that every embodiment and description of the claimed invention requires this clamshell design. (*Id.*). Plaintiffs respond by arguing that the prosecution history demonstrates that the PTO already concluded that claims reciting U-shaped coupling between the frames and the broader claims that ended up in the ’927 patent are distinct inventions, because it held that these claims without the U-shaped limitation, initially filed together with claims expressly requiring U-shaped coupling, were part of a patentably distinct invention and should be filed as a separate application. (*Id.* at 53). Plaintiffs point out that in response to this action from the PTO,

the applicants initially elected to proceed with the U-shaped claims, but later filed the '927 patent, which included broader claims not expressly reciting the U-shaped limitation. (*Id.*).

I conclude that the claims do not require the U-shaped and 180 degree limitations, and that in proposing them, Defendants are seeking to improperly import limitations into the claims from the specification. Initially, I recognize that numerous embodiments of the '927 patent are described in terms of the frames being coupled together via a U-shaped portion and that the abstract states, "The upper frame and the lower frame are integrally molded to be coupled to each other via a U-shaped portion." ('927 patent, abstract). The summary of the invention section also describes, "A first liquid crystal display according to the present invention" as having "the upper and the lower frame [] coupled to each other via a U-shaped portion." (*Id.* col. 2, ll. 6–12). However, the summary of the invention section then goes on to describe three additional "liquid crystal display[s] according to the present invention," none of which mention coupling via a U-shaped portion at all. (*Id.* col. 2, ll. 18–46). In arguing that the objectives of the invention can only be achieved by a U-shaped portion, Defendants exclusively cite the preferred embodiment and the figures it illustrates. (D.I. 146 at 51–52). Defendants cannot point to anything in the specification that purports to limit the invention to frames being coupled with a U-shaped portion or folding at 180 degrees.

Indeed, the prosecution history clearly demonstrates that the claims of the '927 patent are not limited to frames coupled together via a U-shaped portion. The originally filed parent application of the '927 patent included claims that both explicitly claimed U-shaped coupling and claims that did not require that feature, but that only required an intermediate frame. (D.I. 148-1 at 2). The examiner rejected the application as filed, explaining that the application claimed three patentably distinct inventions. (D.I. 148-1 at 7). In doing so, the examiner

indicated the three species of inventions the examiner considered to be patentably distinct, only one of which expressly required U-shaped coupling. (*Id.*). In response, the applicant elected to proceed with the species of claims that expressly required U-shaped coupling of the frames. (*Id.* at 11). The applicant later filed a divisional application that became the '927 patent, the claims of which did not expressly require U-shaped coupling, instead focusing on the use of an intermediate frame. (D.I. 116-2 at 2–12). The '927 patent specification's summary of the invention section describes an embodiment that does not require U-shaped coupling:

A second liquid crystal display according to the present invention is a liquid crystal display having a liquid crystal display panel held between an upper frame and a lower frame by using an intermediate frame, the upper frame having a display window. Here, either of the upper frame or the lower frame has a protrusion formed in the vicinity of its end. The intermediate frame has a depression formed in the vicinity of its end, the depression to be fitted to the protrusion. The intermediate frame is fixed to the frame so that the liquid crystal display panel or the intermediate frame is supported by the stepped draw.

('927 patent, col. 2, ll. 18–28). This description matches the actual claims of the '927 patent and focuses on the use of protrusions and depressions to secure the frames together. It also confirms that U-shaped coupling is a feature distinctly claimed in another patent, which should not be read into the demonstrably different claims of the '927 patent. Accordingly, the Court rejects Defendants' efforts to read in this limitation from the specification.

Lastly, neither party truly disputes what a frame is generally. Plaintiffs' effort to define a frame is neither necessary nor particularly helpful. Therefore, I think the best course is to give "frame" its plain and ordinary meaning and make clear that it does not require U-shaped coupling or 180 degree folding.

2. "stepped protrusion" (asserted claims 1, 5–6)

- a. *Plaintiffs' proposed construction*: "a part that juts out from a surrounding structure and having a change in elevation, excluding hook-shaped member"

- b. *Defendants' proposed construction*: “a part that juts out from a surrounding surface, having stair-like changes in elevation relative to the surface”
- c. *Court's construction*: “a part that juts out from a surrounding structure, having at least one stair-like change in elevation relative to the surface”

The parties disagree on whether the applicant disavowed hook-shapes during prosecution and whether “stepped” encompasses a stair-like change in elevation. (D.I. 146 at 54–58). Plaintiffs argue that the applicant clearly disclaimed hook-shaped protrusions from being stepped protrusions during prosecution and that Defendants’ proposed stair-like limitation is unsupported by the specification and claim language. (*Id.* at 55, 57). Defendants argue that Plaintiffs’ construction ignores the word “stepped” and would be so broad as to “sweep in protrusions in the shape of pyramids or domes” (*Id.* at 55). Defendants cite two dictionary definitions to demonstrate that “stepped” cannot possibly include such types of protrusions. (*Id.* at 56). Lastly, Defendants assert that there was no disclaimer in the prosecution history. (*Id.* at 55–56).

First, I find that the prosecution history does not demonstrate that the applicant disavowed hook-shapes. In response to a section 102(b) rejection, the applicant made numerous arguments to overcome the rejection, most prominently that U.S. Patent. No. 5,680,183 (“Sasuga”) did not disclose a stepped protrusion. (D.I. 116-2 at 8–11). At one point in its argument, the applicant included in parentheses that the stepped protrusion was not hook-shaped. (*Id.* at 10). In later approving the application, the examiner said nothing about hooks, but merely stated that Sasuga does not teach “one of the upper and lower frame including a stepped protrusion (draw) for fixing one of the [LCD] display and the intermediate frame.” (D.I. 116-2 at 71; D.I. 116-4, Ex. 16, p. 3). This does not demonstrate a clear disclaimer of hook-shapes, but only that Sasuga did not disclose a stepped protrusion.

Second, I agree with Defendants that a stepped protrusion should not be construed so broadly as to include a pyramid or a dome. Plaintiffs' proposed construction gives no meaning to the term "stepped," essentially advocating for a construction of "stepped protrusion" that means any protrusion that is not hook-shaped. This would not be proper, especially where, as here, the applicant relied on the stepped protrusion as an important feature distinguishing the '927 patent from the prior art. (D.I. 116-2 at 8–10). *See also Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 950 (Fed. Cir. 2006) ("[C]laims are interpreted with an eye toward giving effect to all terms in the claim."). I think the word "stepped" is used in its plain and ordinary sense, as the '927 patent's specification does not define "stepped" or provide clear guidance as to the meaning of the term in the context of the patent. Defendants' proposed construction comports with the plain and ordinary meaning of "stepped" and is consistent with the Figures in the '927 patent showing stepped protrusions. (*See, e.g.*, '927 patent, Figure 4 (showing stepped protrusions 15a & 15b); D.I. 147-12 at 32, MERRIAM WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE UNABRIDGED (2002) (defining stepped as "having a step or series of steps" and defining step as "the vertical distance of one set of stairs"); *id.* at 28, THE AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE (4th ed. 2000) (defining "step" as "something, such as a ledge or an offset, that resembles a step of a stairway"))).

Accordingly, the Court will construe "stepped protrusion" to mean "a part that juts out from a surrounding structure, having at least one stair-like change in elevation relative to the surface."⁵

3. "vicinity of its end" (claims 1 & 6).

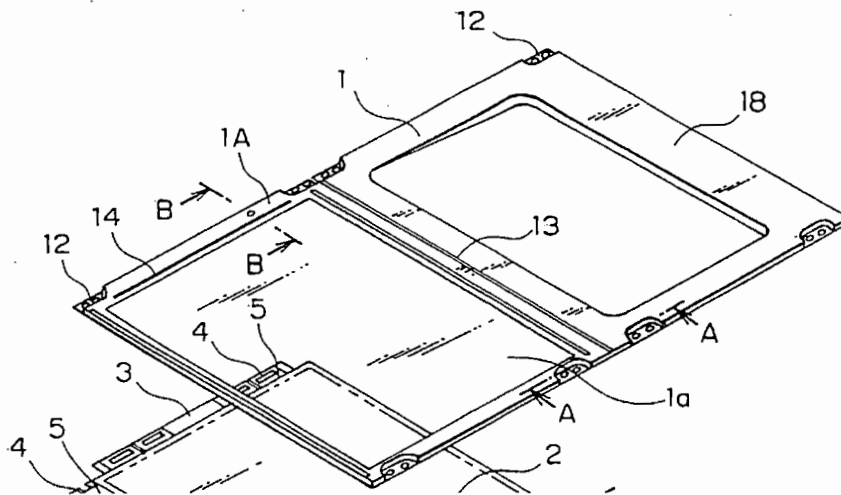
a. *Plaintiffs' proposed construction: "near its end"*

⁵ "At least one" was added to clarify the point, agreed upon by both parties, that the "stepped" limitation does not require more than one change in elevation. (D.I. 146 at 57).

- b. *Defendants' proposed construction*: "Indefinite"
- c. *Court's construction*: "near its end."

Claim 1 of the '927 patent states that "said upper frame and said lower frame comprises a stepped protrusion formed in the vicinity of its end" ('927 patent, claim 1). Defendants argue that the term "in the vicinity of its end" is indefinite because a person seeking to avoid infringement would not know where to place the stepped protrusion so as to fall outside the scope of the claim. (D.I. 146 at 59). Defendants' expert, Richard Flasck, gives two reasons for why a POSA would not know where the end of a frame is. First, he states that because frames are three-dimensional objects with six sides and the patent does not distinguish between ends and sides, a POSA would not know where to find the end of a frame. (D.I. 147-12 at 40-41, ¶¶ 22-24). Second, he states that even if a POSA could identify an end with reasonable certainty, the POSA would not know how close to the end of a structure one needs to be in order to be in the vicinity of that end. (*Id.* at 41, ¶ 25). Mr. Flasck points to multiple sides of the upper and lower frames depicted in Figure 3 and emphasizes that "any of the locations with an arrow could plausibly said to be in the vicinity of the end of the upper or the lower frame." (*Id.* at 41-42, ¶ 26). Plaintiffs' expert, Lawrence Tannas, explains that a POSA "would understand that for a rectangular object, the ends include the lines or borders forming the outer boundaries of the rectangle. One might refer to an 'end' of a rectangular room or object and it would be understood that the line or wall that forms one of the outer boundaries is the end." (D.I. 148-1 at 17, ¶ 15). Mr. Tannas further explains that this is consistent with the specification's description of the protrusions' purpose, to be placed so as to snap together the upper and lower frames and hold them together. (*Id.* (citing '927 patent, col. 4, ll. 14-22; *id.* col. 3, ll. 55-57)).

I think Mr. Tannas' explanation of what a frame's ends are makes more sense in the context of the claims and specification of the '927 patent. The '927 patent claims the use of stepped protrusions to hold a liquid crystal display panel between an upper frame and a lower frame, by utilizing an intermediate frame. (See, e.g., '927 patent, claim 1). The stepped protrusions are generally described throughout the patent as being used to fix various components together. ('927 patent, col. 3, ll. 55-57 ("Near the ends of the frame 1 are arranged circular boss configurations 15 for the sake of fixing the folded surfaces to each other."); *id.* col. 4, ll. 16-20 ("Either of the frames has first protrusions 15a formed in the vicinity of its ends, and the other frame has second protrusions 15b formed in the vicinity of its ends, where the second protrusions 15b is to be fitted into the first protrusions 15a.")). The below portion of Figure 3 shows an upper (1B) and lower (1A) frame in an embodiment that is coupled together by a U-shaped portion. The frames fold together along the U-grooved portion 13.



In this embodiment, it makes sense that the protrusions could be along any of the outer three edges of each frame (aside from the edges held together by the U-shaped groove), as they could snap the two frames together when folded inward. Likewise, in an embodiment not

employing U-shaped folding, it would seem the protrusions could be on any of the outer edges of each frame in order to snap the two frames together. Indeed, the protrusions being on the ends seems to be an inherent requirement of the fact that the claimed upper frame includes a display window. (*See, e.g.*, '927 patent, claim 1). Moreover, I think that the display window and the fixing together function of the protrusions significantly limit how far from the ends of the frames the protrusions could be, and a POSA would be able to figure out how far into the interior of the rectangular frames the protrusions could go without intruding on the display window or otherwise affecting the functionality of the protrusions. Because I find credible Mr. Tannas' straightforward explanation of what the ends of the frames are in the context of the '927 patent, I conclude that the claims of the '927 patent, read in light of the specification, adequately inform a POSA with reasonable certainty about the scope of the invention. *See Nautilus, Inc. v. Biosig Instrum., Inc.*, 134 S. Ct. 2120, 2124 (2014).

4. "a plurality of stepped protrusions formed in the vicinity of its end" (claim 6)

- a. *Plaintiffs' proposed construction*: "at least two parts that jut out from a surrounding structure and having a change in elevation, excluding a hook-shaped member, constructed near its end"
- b. *Defendants' proposed construction*: The phrase is indefinite because the term "vicinity of its end" is indefinite. Alternatively, "a plurality of stepped protrusions formed in the vicinity of one end"
- c. *Court's Construction*: No construction. Defendants' in the vicinity of "one end" limitation is rejected.

Claim 6 of the '927 patent reads: "The liquid crystal display according to claim 1, wherein one of said upper frame and said lower frame comprises a plurality of stepped protrusions formed in the vicinity of its end, said plurality of stepped protrusions differing from each other in a protruding direction." ('927 patent, claim 6). This term is not indefinite for the same reasons discussed above as to claim 1. Defendants add the additional argument here that

“because this claim term uses the phrase ‘its end’ in the singular, the ‘plurality of stepped protrusions formed in the vicinity of its end’ must refer to a plurality in the vicinity of one end.” (D.I. 146 at 63–63). The language preceding “vicinity of its end” uses the open-ended modifier “comprising,” leaving open the possibility for protrusions on more than one end. The specification also consistently discloses embodiments with stepped protrusions on multiple ends of the frames. (See ’927 patent, Figs. 3 & 4, *id.* col. 4, ll. 15–19, 26–30; *id.* col. 5, ll. 30–39). In light of these considerations, I do not think employing the singular “end,” as used throughout the claims of the ’927 patent, excludes embodiments with protrusions on more than one end.

E. The ’190 Patent

The ’190 patent is directed to “[a]n amorphous-silicon TFT (thin-film-transistor) in an LCD device [that] has a larger channel length at both the edge portions of the channel of the TFT compared to the central portion of the channel” (’190 patent, abstract). The larger channel length at the edges “reduces the leakage current caused by the turned-around light incident onto the channel.” (*Id.*). Claim 1 is representative and reads as follows:

1. A liquid crystal display (LCD) device comprising a TFT (thin-film-transistor) substrate mounting thereon a plurality of TFTs each having a channel in an ohmic contact layer and a semiconductor layer;

a counter substrate mounting thereon a black matrix;

a liquid crystal layer sandwiched between said TFT substrate and said counter substrate;

a backlight unit disposed at a rear side of said TFT substrate for irradiating said TFT substrate with backlight, said counter substrate mounting thereon a light shield overlapping said channel of said TFTs as view normal to said counter substrate; and

a rear shield film interposed between said channel of said TFTs and said backlight unit to overlap said channel of said TFTs viewed normal to said TFT substrate,

said channel having a channel length larger at an edge portion of said channel adjacent to one of said pixels than at a central portion thereof, whereupon leakage current of said TFT at said edge portion is suppressed.

(’190 patent, claim 1).

1. “channel in an ohmic contact layer and a semiconductor layer” (claims 1, 9, 13, 15, 16, 20)

- a. *Plaintiffs’ proposed construction*: “a channel region formed in an ohmic contact layer and a semiconductor layer”⁶
- b. *Defendants’ proposed construction*: Plain and ordinary meaning, i.e., “a channel in both an ohmic contact layer and a semiconductor layer.” In the alternative, indefinite.
- c. *Court’s construction*: Plain and ordinary meaning, i.e., “a channel in both an ohmic contact layer and a semiconductor layer.”

Admitting that the specification of the ’190 patent discloses that “the ohmic contact layer is not part of the ‘channel,’” Plaintiffs contend that a claim limitation requiring the channel to be in an ohmic contact layer should be construed to mean “a channel region formed in an ohmic contact layer and a semiconductor layer.” (D.I. 146 at 66–67; D.I. 158 at 2). Defendants contend that Plaintiffs are essentially trying to rewrite the claim limitation in a manner that would render the language “in an ohmic contact layer” superfluous and meaningless, in order to allow the claims to read on “a channel located entirely in a semiconductor layer.” (*Id.* at 67–69). Defendants also argue, “Plaintiffs’ attempt to purge the claims of the ‘in an ohmic contact layer’ requirement is especially improper because this phrase was explicitly added during prosecution in response to a prior art rejection.” (*Id.* at 69).

The Court will adopt Defendants’ proposed construction. Plaintiffs essentially ask for a wholesale rewrite of the claims, in order to correct claims that are inconsistent with the

⁶ Plaintiffs changed their proposed construction at the *Markman* hearing and later submitted a supplemental two-page letter about the construction of this term (D.I. 158), which the Court has reviewed along with Defendants’ letter. (D.I. 159)

specification. As the PTAB previously noted, “Patent Owner’s arguments reduce to the assertion that a skilled artisan knew that the disputed claim phrase meant something other than what it plainly recites.” (D.I. 116-4, Ex. 19, at p. 10). Courts have routinely rejected similar efforts to rewrite unambiguous claim language, even when giving such language its plain meaning would result in nonsensical results or the inevitable invalidation of the claims. *See, e.g., Chef Am., Inc. v. Lamb-Weston, Inc.*, 358 F.3d 1371, 1374 (Fed. Cir. 2004) (“Even a nonsensical result does not require the court to redraft the claims of the [] patent.” (internal quotation marks omitted)); *Allen Eng’g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1349 (Fed. Cir. 2002) (“[Plaintiff] argues that one of skill in the art would understand that the term ‘perpendicular’ in the claim should be read to mean ‘parallel.’ [Plaintiff] stretches the law too far. It is not our function to rewrite claims to preserve their validity.”).

Plaintiffs’ effort to rewrite the express claim language further ignores that the applicant amended the claims to include “in an ohmic contact layer” and expressly relied on this amendment in seeking to overcome a prior art rejection. (D.I. 116-4 at 87 (showing amendment); *id.* at 91 (“Miura, et al does not teach a channel formed in an ohmic contact layer and a semiconductor layer”)). The Federal Circuit has made clear that “unambiguous claim language [in an] amended claim controls over any contradictory language in the written description.” *Elekta Instrum. S.A. v. O.U.R. Sci. Int’l, Inc.*, 214 F.3d 1302, 1308 (Fed. Cir. 2000). Accordingly, Plaintiffs’ effort to rewrite the express claim language must fail.

The Court will construe the term “channel in an ohmic contact layer and a semiconductor layer” to have its plain and ordinary meaning, which is “a channel in both an ohmic contact layer and a semiconductor layer.”

2. “channel”

- a. *Plaintiffs’ proposed construction*: “a region of a TFT between a source electrode and a drain electrode that overlies the gate electrode and through which charge carriers flow when the TFT is in an ON state.”
- b. *Defendants’ proposed construction*: “a portion of the semiconductor layer between a source electrode and drain electrodes⁷ whose conductivity is controlled by the gate voltage”
- c. *Court’s construction*: “a portion of the semiconductor layer between a source electrode and a drain electrode whose conductivity is controlled by the gate voltage”

The parties dispute whether the term “channel” contemplates the entire “region” of a TFT between a source electrode and drain electrode that overlies the gate electrode or is limited to being an actual portion of the semiconductor layer. (D.I. 146 at 74–77). Plaintiffs argue that because “channel” and “channel region” are used interchangeably in the ’190 patent, channel should be construed broadly as a “channel region.” (*Id.* at 74–75). Defendants argue that Plaintiffs’ construction is overbroad, because it is not limited to the semiconductor layer and “would extend to any region between the source and drain, overlying the gate electrode, ‘where charge carriers flow when the TFT is in an ON state.’” (*Id.* at 75). Defendants continue that Plaintiffs’ construction “could include other layers or material whose conductivity is not generally affected by the gate voltage, including the ohmic contact layer . . . as well as intermediate metal layers.” (*Id.*). Defendants also point to earlier arguments in the joint claim construction brief by Plaintiffs acknowledging that “‘the region that is turned on and off by the gate electrode 11 (i.e., the channel) is in the a-Si semiconductor layer 23, and does not include the ohmic contact layer 24a or 24b.’” (*Id.* (quoting *id.* at 67)). Plaintiffs respond that

⁷ The Court assumes that Defendants did not purposefully make drain electrodes plural while keeping source electrode singular. While choosing to adopt Defendants’ proposed construction, the Court sees no reason for its construction to contemplate drain electrodes (plural), at least with reference to the relevant subject matter of a single channel being between a source electrode and a drain electrode.

Defendants misconstrue the meaning of the word “between” as including the ohmic contact layer and point out that “between” refers to space made up by “the empty area above the channel 14 that is formed by the channel etching process.” (*Id.* at 76).

The summary of the invention section makes clear that the channel is made up entirely of the portion of the semiconductor layer between the source electrode and the drain electrode. ('190 patent, col. 3, ll. 38–39 (“each of the TFTs having a channel in a semiconductor layer”); *id.* col. 3:47–53 (“etching a portion of said patterned ohmic contact layer between said source electrode and said drain electrode by using said source electrode and said drain electrode as a mask to thereby expose *a portion of said semiconductor layer as a channel . . .*” (emphasis added); *id.* col. 4, ll. 9–14 (same)). Defendants’ construction captures the fact that the channel is made up entirely of the semiconductor layer, and is consistent with Figure 2F of the '190 patent. Plaintiffs offer no compelling reason to broaden the chosen claim language to a “region.” Instead, they merely make some vague reference to their construction capturing the “empty area” above the channel 14 that is formed by the channel etching process. This appears to be another effort on the part of Plaintiffs to salvage claims that are inconsistent with the specification. The Court sees nothing in the '190 patent to suggest that the word channel was meant to capture such “empty space.” The parties do not otherwise contest that the channel has conductive properties.

Accordingly, the Court will construe “channel” to mean “a portion of the semiconductor layer between a source electrode and drain electrode whose conductivity is controlled by the gate voltage.”

F. The '352 Patent

While the parties briefed claim constructions for the '352 patent, these disputes are no longer at issue because the parties recently stipulated to dismiss the '352 patent from this suit.

IV. CONCLUSION

Within five days the parties shall submit a proposed order consistent with this Memorandum Opinion.